ATGM Countermeasures

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Two events during the past few years have contributed significantly to a worldwide proliferation of antitank guided missile countermeasures (ATGM-CMs)—the end of the Cold War and the dramatic allied success in the Persian Gulf War.

It is therefore important that U.S. ATGM gunners and antiarmor leaders become more aware of the common countermeasures that could be used against them. The recent information on the subject offered here should prove helpful. The discussion of foreign ATGM-CM examples in this article is intended to show the technology available, not to identify specific threats to U.S. forces.

ATGM-CMs to achieve hit avoidance can be used against ATGM gunners, systems, or munitions. Those available include reactive armor, smoke or obscurants, and active protection systems (APSs), both softkill and hardkill.

Reactive Armor

Several countries—including the Czech Republic, Israel, Poland, Russia, and the United Kingdom—offer reactive armor for sale.

In reactive armor, an explosive sandwiched between metal plates detonates and jettisons the outer metal upon contact of the shaped-charge munition. The rapid motion of the outer metal plate disrupts the shaped-charge jet to defeat or reduce penetration. The flying metal plates cause the jet to cut through new metal, which reduces the shaped-charge's ability to penetrate the tank.

Newer reactive armors can be developed to counter ATGMs that were developed with tip charges to defeat first-generation reactive armor. Russian second-generation reactive armor, called Kontact-5, provides an equivalent protection level for a T-55 tank of up to 900mm and is also advertised to be effective against kinetic energy projectiles.

Potential counter-countermeasures against tanks equipped with reactive armor include engaging where there is no reactive armor or engaging the reactive armor at 0 degrees obliquity (perpendicular to the angle of the reactive armor).

Smoke and Obscurants

Many countries consider the use of obscurants essential to success in both offensive and defensive operations on the modern battlefield. Most also have in their inventories a wide range of obscurant disseminating systems and have stressed the increasing importance of obscurants. Obscurant-filled projectiles, used typically to lay blinding smoke on ATGM positions, are particularly useful with smoke-grenade launchers, which provide a fast way of screening the vehicle. Obscurants launched from these grenade launchers can block the view of the target or interfere with ATGM guidance.

In addition to the smoke grenade launchers, many combat vehicles have a vehicle engine exhaust smoke system, which sprays diesel fuel into the exhaust manifold. This system is used to produce obscurants to protect the unit's movement. The obscurants interfere with direct-view optics, image intensification sights, ATGM guidance, and lasers. Although thermal sights enable the gunner to see through some smoke, he may not be able to maintain control of the ATGM through it and may lose the missile unless he is using a TOW-2 family of missiles, a modified missile guidance system, and the thermal sight.

Improved obscurants can reduce the effectiveness of thermal sights. Advanced obscurant grenades create multispectral clouds that affect thermal sights and ATGM guidance systems. For example, a German firm offers for sale a vehicle-launched IR screening smoke grenade, the NS 20, which is efficient in the 3-to-5 micron and 8-to-12 micron regions. The NS 20 would be effective against thermal sights. The Russians offer an aerosol screen that is reported to be effective in the visible through IR range (.4 to 14 microns). This smoke is deployed by 12 smoke grenade launchers 50 to 80 meters from the tank, is established in three seconds, and lasts for about 20 seconds.

A French company has developed the GALIX combat vehicle protection system, which fires a variety of 80mm grenades, activated from inside the vehicle. The grenades available for the system include smoke, antipersonnel, flare, tear gas, and IR decoy. The GALIX is part of the Leclerc tank.

Potential counter-countermeasures to smoke include: looking for holes in the smoke or using flanking or oblique fire to engage a different target; moving to another firing position from which the targets can be seen and engaged; considering the wind direction and speed when selecting alternate sites; and using TOW-2 family ATGMs with modified missile guidance systems, and thermal sight to overcome the effects of smoke.

Active Protection Systems

Active protection systems (APSs) electronically sense incoming direct-fire ATGMs and HEAT (high-explosive antitank) munitions and defeat them before they hit the vehicle. These include both

soft-kill and hard-kill systems. Soft-kill systems cause the ATGM to miss the target. Hard-kill systems fire munitions at incoming rounds to destroy, neutralize, or detonate them. Several countries—including France, Germany, Israel, Russia, and the United Kingdom—are developing APSs, including those discussed here.

Soft-kill Systems. Many armored vehicles are equipped with laser warning receivers (LWRs) to alert the crews when their vehicles have been scanned by a laser rangefinder. A receiver can tell the crew the type of rangefinder or designator and the direction of the laser. The crew can then take evasive action, either firing its weapons at the laser or launching smoke. Some tanks have their laser warning receivers linked to the smoke grenade launchers, causing smoke to be employed automatically when a laser strike is detected.

The Polish BOBRAWA system—one of the first integrated anti-ATGM packages developed for export—includes the LWRs and 13 81mm smoke grenade launchers. The Polish PT-91 tank has 24 smoke grenade launchers.

Potential counter-countermeasures to LWRs include limiting the use of laser rangefinders or using one on an object near the target vehicle, instead of on the target itself, to determine range to the target. (The object selected should be at least three vehicle lengths from the target vehicle to avoid triggering the LWR with the laser.) In certain situations, it may be advantageous to employ the laser rangefinder on suspected enemy positions to trigger the LWR and have the enemy tank launch smoke to confirm that it is there.

ATGM infrared (IR) jammers use an IR signal to confuse an ATGM in flight with erroneous signals, causing it to miss its target. During the Gulf War, Iraqi T-72 tanks were identified as using Chinese manufactured IR jammers.

The Russian SHTORA-1 (TShU-1) includes an IR jammer that may be effective against first-generation SACLOS (semiactive command line of sight) ATGMs such as TOW, Dragon, Milan, Cobra, AT-3, and HOT (high-subsonic optically teleguided). According to Russian advertisements, the SHTORA-1 can be mounted on T-72, T-80, and T-90 tanks and a variety of other armored combat vehicles. The SHTORA-1 defense includes a computer control complex, two ATGM jammers (one on either side of the main gun), 8 to 12 smoke grenade launchers, and four laser warning receivers that can automatically orient the main gun on the laser and launch the grenades.

Potential counter-countermeasures to ATGM jammers include detecting them with image intensifier and thermal sights before ATGM launch, selecting a different method of attack, and using TOW-2 family ATGMs with modified missile guidance systems and thermal sights to overcome the effects of the jammers.

Many armies use laser rangefinders and target designators, which can cause temporary or permanent injury to the eyes of soldiers using direct view magnifying optics without the correct laser filters. Some countries are developing more powerful lasers as weapons. Lasers can jam or damage electro-optical sights—depending on their power and range and the atmospheric conditions—and can also be used to locate optics through a process called retro-reflection.

China recently displayed such a manportable laser weapon—the ZM-87—which may be effective out to ten kilometers. The ZM-87 consists of a portable electric energy converter (supplied by battery), an optical transmitter, a tripod with a sighting regulator, and a cable connector. It is designed to blind soldiers and damage photoelectric sensors, including the detectors in laser rangefinders and video cameras, or the seeker heads in laser-guided missiles.

Potential counter-countermeasures to enemy lasers include the following:

- Using laser warning receivers to warn the crew of laser use and covering optics when not in use.
- Using laser filters (in the appropriate wavelength) on direct-view optics, or thermal and image intensifier devices to protect the soldier's eyes from laser injuries. The ballistic or laser eye protection system (BLEPS) will protect the individual soldier's eyes from lasers so long as magnifying optics are not used in front of the BLEPS.
- Using smoke to block laser energy and suppressing the laser weapon with direct fire.

Hard-kill Systems. The Russian DROZD detects an incoming ATGM and fires a projectile to destroy or neutralize it. The DROZD, which is effective against both antitank grenades and ATGMs, uses a radar to detect incoming munitions and has eight counter-munitions available. It has been seen mounted on the T-55 modernized tank.

Another Russian designed system, the ARENA, which is still in development, may be effective against antitank grenades and ATGMs. It provides 180-degree protection, uses a radar to detect incoming munitions, and has 22 countermunitions available. German and French companies are working with the Russian company to develop and market the ARENA system.

A British company is developing the Defender Tank Antimissile System (TAMS), which uses a radar to detect the incoming round and twin 7.62mm chain guns to engage incoming munitions.

Even hard-kill systems do not protect a vehicle from all directions. Potential counter-countermeasures to enemy tanks equipped with hardkill systems are to engage the targets in their vulnerable areas; use artillery or kinetic energy rounds to destroy externally mounted sensors and countermeasure dispensers; and use antitank mines to slow, turn, or stop enemy tanks.

U.S. antiarmor crews can expect their positions to be attacked with both direct and indirect fire. New direct-fire munitions include smart high explosive fragmentation (HE-FRAG) rounds that are programmed to explode over a target, ATGMs with blast warheads, and direct-fire flechette rounds. A 125mm HE-FRAG round, available on the open market, can be programmed to explode over a defensive position out to five kilometers, or it can be contact-detonated out to 9.7 kilometers. The BMP-3's 100mm HE-FRAG round could be used to destroy ATGM positions out to four kilometers. The Swedish CV-90 infantry fighting vehicle has a 40mm gun equipped with the 3P round, which can be programmed to explode over a defensive position.

Many foreign ATGMs have longer

ranges and faster speeds than U.S. ATGMs, and several of them can be equipped with blast warheads for use against defensive positions. Consequently, it is possible for a U.S. ATGM gunner and an enemy ATGM gunner to engage each other at the same time, in which case the enemy missile would hit first. Thermal sights for ATGMs are also being offered for sale.

Indirect fire munitions include obscurant-filled projectiles, guided projectiles, submunitions, fuel air explosives, and flechettes. The Russians offer a 120mm gun, mounted on the 2S9, 2S23, and 2S31 self-propelled gun vehicles. It can put direct fire out to 800 meters, HE fragmentation mortar rounds to 7.1 kilometers, HE-FRAG howitzer rounds to 8.7 kilometers, and HE-rocket-assisted projectile (HE-RAP) rounds to 12 kilometers. The Russians offer for sale 122mm and 152mm flechette rounds that could be extremely effective against unprotected positions.

Potential counter-countermeasures include shooting and then moving to alternate positions, conducting effective counterreconnaissance operations, using camouflage and concealment to prevent detection, and using overhead cover to protect against indirect-fire munitions.

Given all of these potential ATGM countermeasures, it is clear that all antiarmor personnel must become familiar with them and then practice and train against them. Toward that end, the Infantry School is updating Field Manual 7-91, *Tactical Employment of Antiarmor Platoons, Companies, and Battalions.* Additionally, the school, along with the National Ground Intelligence Center, is developing an ATGM countermeasure video that should be available some time this year.

Enemy ATGM-CMs on the battlefields of today and tomorrow could severely affect the way this country fights antiarmor battles. In terms of the availability of potential ATGM-CMs, almost every enemy armored vehicle will have smoke grenade launchers and use camouflage. Most enemy tanks could have explosive reactive armor, many could have laser warning receivers, and some could have ATGM jammers and hard-kill active protection systems. Some may even have laser weapons.

Since the Persian Gulf war, ATGM countermeasures have received new priority in many of the armed forces of the world, and many countries are likely to develop them or otherwise acquire them on the international arms market. Although most of these ATGM countermeasures have yet to prove their combat effectiveness, there is little doubt that ATGM combat will continue to become more difficult.

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LRS Missions

What Generates the Need for Them?

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Soldiers always perform their missions better when they understand how those missions fit into the overall operation. We often send our soldiers out with such instructions as, "Man OP 3," or "Observe NAI 9." But we don't clarify *why* they need to conduct reconnaissance or how important the information they gather may be to the commander. Soldiers who understand the big picture will better understand the need to collect and report information quickly, and will give their commanders more accurate and timely reports.

If our long-range surveillance (LRS) leaders are to fully understand, they must be familiar with the three tools of the tactician: The troop-leading procedures (TLPs); the estimate of the situation; and the intelligence preparation of the battlefield (see accompanying box).

Our noncommissioned officer education system does a good job of exposing our NCOs to the TLPs, but few of the leaders I have seen know much about the estimate or the IPB. None of us can become experts on these three tools in a day, but LRS leaders need to be exposed to the basics and know how they apply to the generation of reconnaissance and surveillance missions.

The need for information begins immediately after step one of the TLPs, and usually upon receipt of the warning order. The commander and his staff conduct a mission analysis, and the IPB process begins. An infantry division will illustrate the process:

The division commander begins his mission analysis after receiving the warning order and completes it shortly after receiving the operations order. When the